Acoustical Activity in $La_3Ga_5SIO_{14}$ and $Nd_3Ga_5SiO_{14}$ Crystals

F.R. Akhmedzhanov
Samarkand State University
Univ. blvd 15
703004, Samarkand Uzbekistan

Acoustical activity in piezoelectric crystals $La_3Ga_5SiO_{14}$ and $Nd_3Ga_5SiO_{14}$ (point group 32) has been studied by the method of Bragg light scattering on the coherent acoustic waves at the room temperature. The examined samples were cut from optically clear single crystals and oriented along the crystallographic axis of the third order with the accuracy of 10'.

The plane-polarized transverse acoustic waves with the frequencies 0.4-1.5 GHz were excited by piezoelectric transducers of lithium niobate of appropriate cuts with a fundamental resonance frequency of 30-50 MHz.

The values of the specific rotation of polarization vector of the transverse acoustic waves have been estimated from the measurements of the dependence of the scattering light intensity to the distance to the piezotransducer along the direction of the acoustic wave propagation. The measurements were taken automatically by computer, which worked under the control of the special program in Pascal.

The obtained values of the specific rotation have been used to calculate the effective constants of the acoustical activity along the investigated direction, using the square-law frequency dependence of the attenuation of the investigated acoustic waves. These results are analyzed in terms of a fourth-rank pseudotensor, which is equivalent to the fifth-rank acoustic gyrotropic tensor, and are compared with ones based on the theory of acoustical activity by Portigal and Burstein. Practical problems involved in the observation of acoustical activity are discussed.